FAIRCHILD
SEMICONDUCTOR®

July 2001
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NC7NZ17
TinyLogic® UHS Triple Buffer with Schmitt Trigger Inputs

General Description

The NC7NZ17 is a triple buffer with Schmitt trigger inputs from Fairchild's Ultra High Speed Series of TinyLogic® in the US8 package. The device is fabricated with advanced CMOS technology to achieve ultra high speed with high output drive while maintaining low static power dissipation over a very broad V_{CC} operating range. The device is specified to operate over the 1.65V to 5.5V V_{CC} range. The inputs and outputs are high impedance when V_{CC} is 0V. Inputs tolerate voltages up to 7V independent of V_{CC} operating voltage. Schmitt trigger inputs typically achieve 1V hysteresis between the positive going and negative going input threshold voltage at 5V V_{CC}.

Features

- Space saving US8 surface mount package
- MicroPak™ leadless package
- Ultra High Speed: t_{PD} 3.6 ns Typ into 50 pF at 5V V_{CC}
- High Output Drive: ±24 mA at 3V V_{CC}
- Broad V_{CC} Operating Range; 1.65V to 5.5V
- Power down high impedance inputs/outputs
- Overvoltage tolerant inputs facilitate 5V to 3V translation
- Patented noise/EMI reduction circuitry implemented

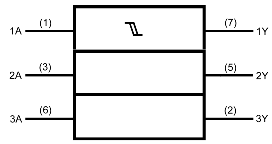
Ordering Code:

Order Number	Package Number	Product Code Top Mark	Package Description	Supplied As
NC7NZ17K8X	MAB08A	7NZ17	8-Lead US8, JEDEC MO-187, Variation CA 3.1mm Wide	3k Units on Tape and Reel
NC7NZ17L8X (Preliminary)	MAC08A	U4	8-Lead MicroPak, 1.6 mm Wide	5k Units on Tape and Reel

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MicroPak™ is a trademark of Fairchild Semiconductor Corporation.

Logic Symbol

IEEE/IEC



Pin Descriptions

Pin Names	Description
A_1, A_2, A_3	Data Inputs
Y_1, Y_2, Y_3	Output

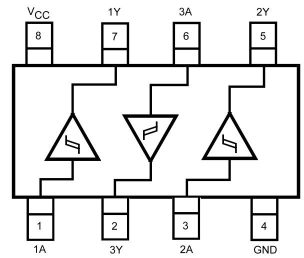
Function Table

Y = A

Input	Output
A	**Y**
L	L
H	H

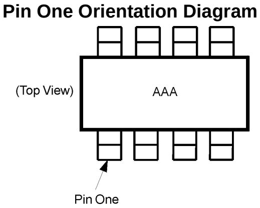
H = HIGH Logic Level
L = LOW Logic Level

Connection Diagrams



(Top View)

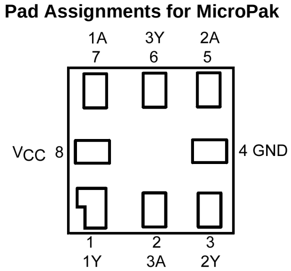
Pin One Orientation Diagram



AAA represents Product Code Top Mark - see ordering code

Note: Orientation of Top Mark determines Pin One location. Read the Top Product Code Mark left to right, Pin One is the lower left pin (see diagram).

Pad Assignments for MicroPak



(Top Thru View)

Absolute Maximum Ratings (Note 1)

Supply Voltage (V_{CC})	−0.5V to +7V
DC Input Voltage (V_{IN})	−0.5V to +7V
DC Output Voltage (V_{OUT})	−0.5V to +7V
DC Input Diode Current (I_{IK})	
@ V_{IN} < −0.5V	−50 mA
DC Output Diode Current (I_{OK})	
@ V_{OUT} < −0.5V	−50 mA
DC Output Current (I_{OUT})	±50 mA
DC V_{CC}/GND Current (I_{CC}/I_{GND})	±100 mA
Storage Temperature (T_{STG})	−65°C to +150°C
Junction Temperature under Bias (T_J)	150°C
Junction Lead Temperature (T_L)	
(Soldering, 10 seconds)	260°C
Power Dissipation (P_D) @ +85°C	250 mW

Recommended Operating Conditions (Note 2)

Supply Voltage Operating (V_{CC})	1.65V to 5.5V
Supply Voltage Data Retention (V_{CC})	1.5V to 5.5V
Input Voltage (V_{IN})	0V to 5.5V
Output Voltage (V_{OUT})	0V to V_{CC}
Operating Temperature (T_A)	−40°C to +85°C
Thermal Resistance (θ_{JA})	250°C/W

Note 1: Absolute maximum ratings are DC values beyond which the device may be damaged or have its useful life impaired. The datasheet specifications should be met, without exception, to ensure that the system design is reliable over its power supply, temperature, and output/input loading variables. Fairchild does not recommend operation outside datasheet specifications.

Note 2: Unused inputs must be held HIGH or LOW. They may not float.

DC Electrical Characteristics

Symbol	Parameter	V_{CC} (V)	T_A = +25°C Min	Typ	Max	T_A = −40°C to +85°C Min	Max	Units	Conditions	
V_P	Positive Threshold Voltage	1.65	0.7	1.07	1.5	0.7	1.5	V		
		2.3	1.0	1.38	1.8	1.0	1.8			
		3.0	1.3	1.74	2.2	1.3	2.2			
		4.5	1.9	2.43	3.1	1.9	3.1			
		5.5	2.2	2.88	3.6	2.2	3.6			
V_N	Negative Threshold Voltage	1.65	0.25	0.56	0.9	0.25	0.9	V		
		2.3	0.40	0.75	1.15	0.40	1.15			
		3.0	0.6	0.98	1.5	0.6	1.5			
		4.5	1.0	1.42	2.0	1.0	2.0			
		5.5	1.2	1.68	2.3	1.2	2.3			
V_H	Hysteresis Voltage	1.65	0.15	0.51	1.0	0.15	1.0	V		
		2.3	0.25	0.62	1.1	0.25	1.1			
		3.0	0.4	0.76	1.2	0.4	1.2			
		4.5	0.6	1.01	1.5	0.6	1.5			
		5.5	0.7	1.20	1.7	0.7	1.7			
V_{OH}	HIGH Level Output Voltage	1.65	1.55	1.65		1.55		V	$V_{IN} = V_{IH}$	I_{OH} = −100 µA
		2.3	2.2	2.3		2.2				
		3.0	2.9	3.0		2.9				
		4.5	4.4	4.5		4.4				
		1.65	1.29	1.52		1.29				I_{OH} = −4 mA
		2.3	1.9	2.14		1.9				I_{OH} = −8 mA
		3.0	2.4	2.75		2.4				I_{OH} = −16 mA
		3.0	2.3	2.62		2.3				I_{OH} = −24 mA
		4.5	3.8	4.13		3.8				I_{OH} = −32 mA
V_{OL}	LOW Level Output Voltage	1.65		0.0	0.1		0.1	V	$V_{IN} = V_{IL}$	I_{OL} = 100 µA
		2.3		0.0	0.1		0.1			
		3.0		0.0	0.1		0.1			
		4.5		0.0	0.1		0.1			
		1.65		0.08	0.24		0.24			I_{OL} = 4 mA
		2.3		0.10	0.3		0.3			I_{OL} = 8 mA
		3.0		0.16	0.4		0.4			I_{OL} = 16 mA
		3.0		0.24	0.55		0.55			I_{OL} = 24 mA
		4.5		0.25	0.55		0.55			I_{OL} = 32 mA
I_{IN}	Input Leakage Current	0 to 5.5			±0.1		±1.0	µA	V_{IN} = 5.5V, GND	
I_{OFF}	Power Off Leakage Current	0.0			1		10	µA	V_{IN} or V_{OUT} = 5.5V	

DC Electrical Characteristics (Continued)

Symbol	Parameter	V_{CC} (V)	$T_A = +25°C$ Min	$T_A = +25°C$ Typ	$T_A = +25°C$ Max	$T_A = -40°C$ to $+85°C$ Min	$T_A = -40°C$ to $+85°C$ Max	Units	Conditions
I_{CC}	Quiescent Supply Current	1.65 to 5.5			1.0		10	μA	$V_{IN} = 5.5V$, GND

AC Electrical Characteristics

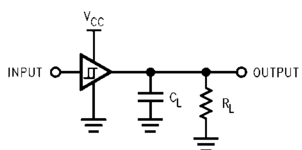
Symbol	Parameter	V_{CC} (V)	$T_A = +25°C$ Min	$T_A = +25°C$ Typ	$T_A = +25°C$ Max	$T_A = -40°C$ to $+85°C$ Min	$T_A = -40°C$ to $+85°C$ Max	Units	Conditions	Figure Number
t_{PLH} t_{PHL}	Propagation Delay	1.8 ± 0.15	2.0	6.9	11.9	2.0	13.1	ns	$C_L = 15$ pF, $R_L = 1$ MΩ	Figures 1, 3
		2.5 ± 0.2	1.5	4.8	8.2	1.5	9.0			
		3.3 ± 0.3	1.0	3.7	5.6	1.0	6.2			
		5.0 ± 0.5	0.8	3.0	4.7	0.8	5.2			
t_{PLH} t_{PHL}	Propagation Delay	3.3 ± 0.3	1.5	4.3	6.6	1.5	7.3	ns	$C_L = 50$ pF, $R_L = 500Ω$	Figures 1, 3
		5.0 ± 0.5	1.0	3.6	5.6	1.0	6.2			
C_{IN}	Input Capacitance	0		2.5				pF		
C_{PD}	Power Dissipation Capacitance	3.3		9				pF	(Note 3)	Figure 2
		5.0		11						

Note 3: C_{PD} is defined as the value of the internal equivalent capacitance which is derived from dynamic operating current consumption (I_{CCD}) at no output loading and operating at 50% duty cycle. (See Figure 2.) C_{PD} is related to I_{CCD} dynamic operating current by the expression:
$I_{CCD} = (C_{PD})(V_{CC})(f_{IN}) + (I_{CC}static)$.

Dynamic Switching Characteristics

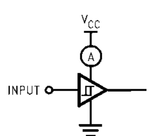
Symbol	Parameter	Conditions	V_{CC} (V)	$T_A = 25°C$ Typical	Unit
V_{OLP}	Quiet Output Dynamic Peak V_{OL}	$C_L = 50pF$, $V_{IH} = 5.0V$, $V_{IL} = 0V$	5.0	0.8	V
V_{OLV}	Quiet Output Dynamic Valley V_{OL}	$C_L = 50pF$, $V_{IH} = 5.0V$, $V_{IL} = 0V$	5.0	–0.8	V

AC Loading and Waveforms



C_L includes load and stray capacitance
Input PRR = 1.0 MHz; $t_W = 500$ ns

FIGURE 1. AC Test Circuit



Input = AC Waveform; $t_r = t_f = 1.8$ ns;
PRR = variable; Duty Cycle = 50%

FIGURE 2. I_{CCD} Test Circuit

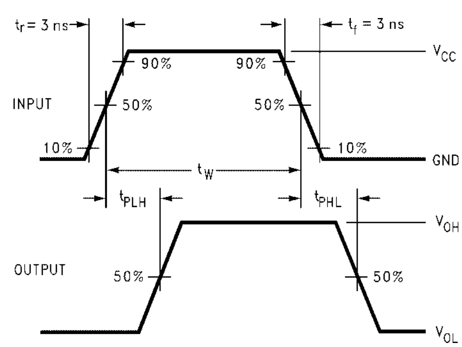


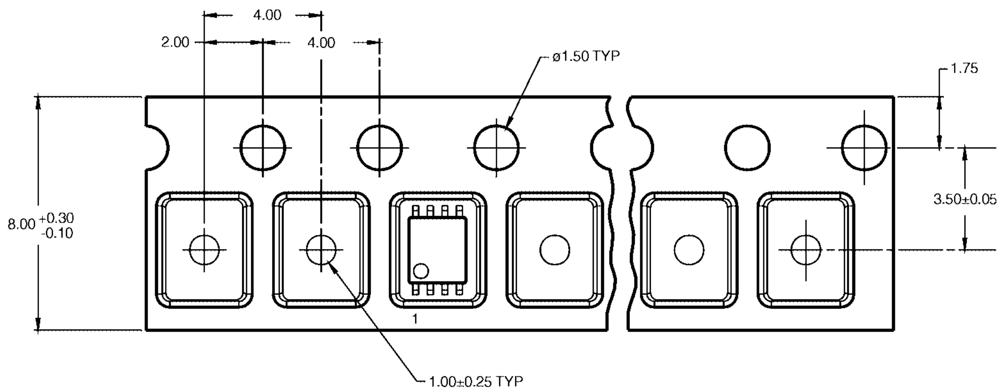
FIGURE 3. AC Waveforms

Tape and Reel Specification

TAPE FORMAT for US8

Package Designator	Tape Section	Number Cavities	Cavity Status	Cover Tape Status
K8X	Leader (Start End)	125 (typ)	Empty	Sealed
	Carrier	3000	Filled	Sealed
	Trailer (Hub End)	75 (typ)	Empty	Sealed

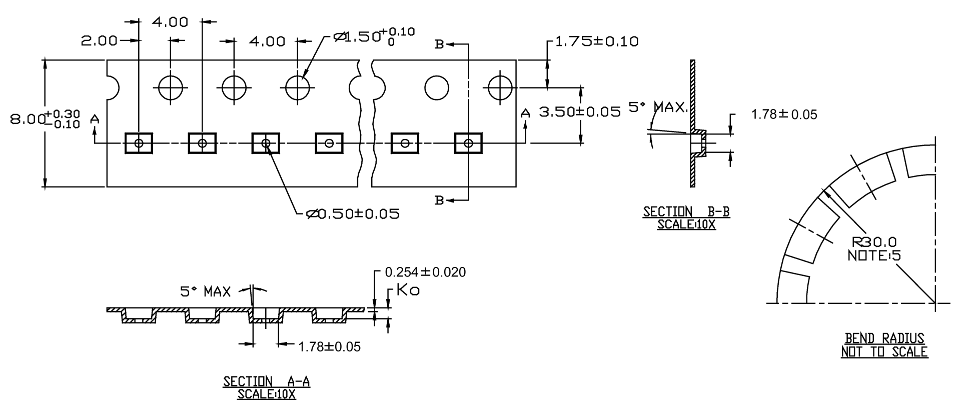
TAPE DIMENSIONS inches (millimeters)



TAPE FORMAT for MicroPak

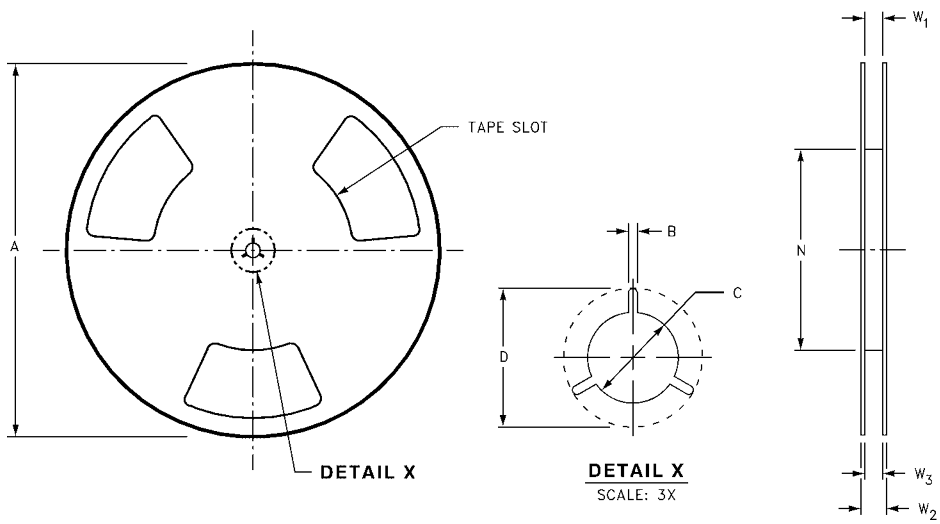
Package Designator	Tape Section	Number Cavities	Cavity Status	Cover Tape Status
L8X	Leader (Start End)	125 (typ)	Empty	Sealed
	Carrier	3000	Filled	Sealed
	Trailer (Hub End)	75 (typ)	Empty	Sealed

TAPE DIMENSIONS inches (millimeters)



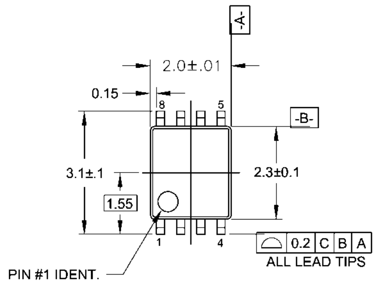
Tape and Reel Specification (Continued)

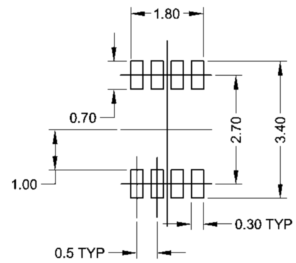
REEL DIMENSIONS inches (millimeters)



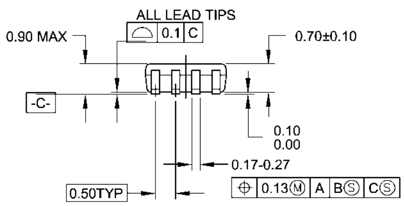
Tape Size	A	B	C	D	N	W1	W2	W3
8 mm	7.0 (177.8)	0.059 (1.50)	0.512 (13.00)	0.795 (20.20)	2.165 (55.00)	0.331 + 0.059/–0.000 (8.40 + 1.50/–0.00)	0.567 (14.40)	W1 + 0.078/–0.039 (W1 + 2.00/–1.00)

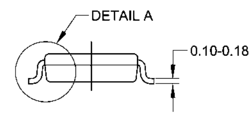
Physical Dimensions inches (millimeters) unless otherwise noted

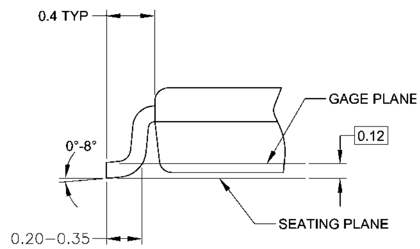




LAND PATTERN RECOMMENDATION







DETAIL A

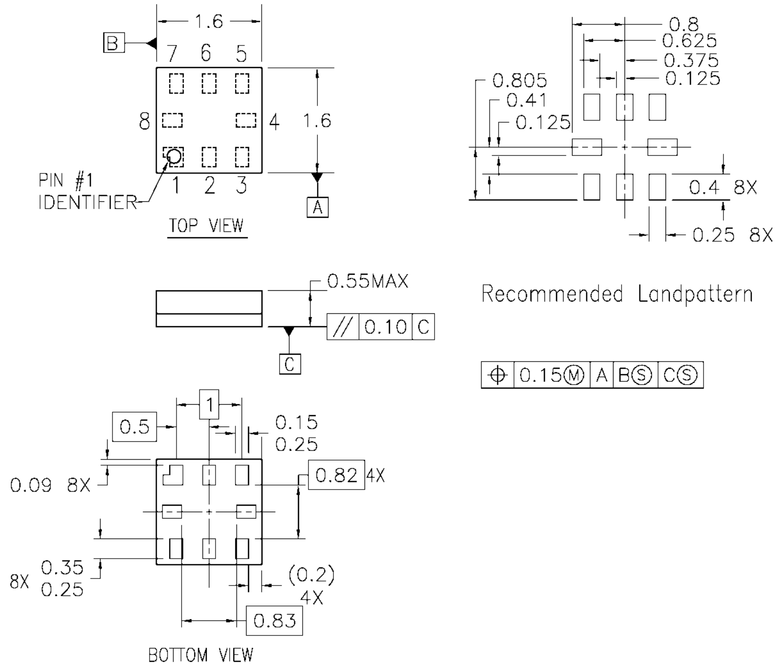
NOTES:

A. CONFORMS TO JEDEC REGISTRATION MO-187
B. DIMENSIONS ARE IN MILLIMETERS.
C. DIMENSIONS ARE EXCLUSIVE OF BURRS, MOLD FLASH, AND TIE BAR EXTRUSIONS.
D. DIMENSIONS AND TOLERANCES PER ANSI Y14.5M, 1982.

MAB08AREVC

8-Lead US8, JEDEC MO-187, Variation CA 3.1mm Wide
Package Number MAB08A

Physical Dimensions inches (millimeters) unless otherwise noted (Continued)



Notes:
1. PACKAGE REGISTRATION WITH JEDEC IS ANTICIPATED
2. DIMENSIONS ARE IN MILLIMETERS
3. DRAWING CONFORMS TO ASME Y.14M−1994

MAC08AREVB

8-Lead MicroPak, 1.6 mm Wide
Package Number MAC08A
(Preliminary)